

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
29 December 2004 (29.12.2004)

PCT

(10) International Publication Number  
**WO 2004/112918 A1**

(51) International Patent Classification<sup>7</sup>: A63B 69/06,  
22/16

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(21) International Application Number:  
PCT/NO2004/000183

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(22) International Filing Date: 22 June 2004 (22.06.2004)

(81) Designated States (*unless otherwise indicated, for every  
kind of national protection available*): AE, AG, AL, AM,  
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,  
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,  
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,  
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,  
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,  
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,  
TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM,  
ZW.

(25) Filing Language: Norwegian

(26) Publication Language: English

(30) Priority Data:  
20032901 24 June 2003 (24.06.2003) NO

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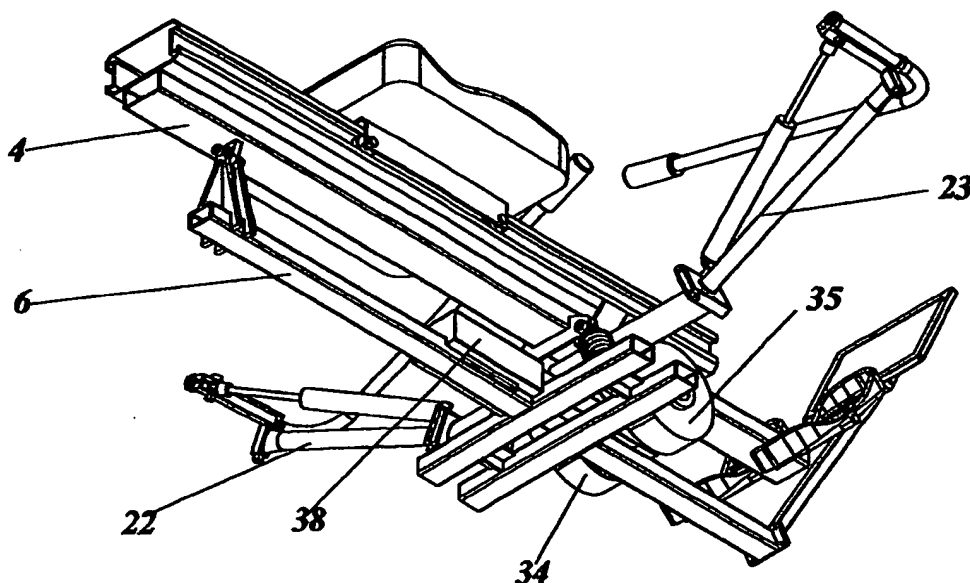
(84) Designated States (*unless otherwise indicated, for every  
kind of regional protection available*): ARIPO (BW, GH,  
GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,  
ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),  
European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,  
FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI,

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[Continued on next page]

(54) Title: PHYSICAL EXERCISE APPARATUS



(57) Abstract: A physical exercise apparatus intended for stationary placement during use, wherein the apparatus includes a hydraulic system for providing sitting instability and/or generating exercise resistance. The hydraulic system consists of at least two hydraulic cylinders and at least two stabiliser cylinders, the hydraulic cylinders during use of the apparatus being designed to deliver a pressure which actuates the function of said stabiliser cylinders for generating said instability of the exercise apparatus. The apparatus may be in the form of a rowing machine or a paddling machine.

WO 2004/112918 A1



SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

**Published:**

— *with international search report*

**PHYSICAL EXERCISE APPARATUS**

The present invention relates to a physical exercise apparatus, as disclosed in the preamble of the attached claims. More specifically, the invention is related to the type of such apparatus that is constructed to enable an apparatus user to perform exercises that simulate rowing or paddling. It is a particular object that such an apparatus should be suitable for strengthening and rehabilitating a person's muscles, and it is advantageously related to the principle of having to balance and control instability during physical exertion.

The invention represents a new way of giving a person the possibility of movement and activity of muscles in the abdominal and/or back region and generally along the whole spinal column, as well as in the upper part of the body and arms, when the person is sitting on an exercise apparatus of this type which simulates rowing in a rowing boat, preferably a rowing boat for competition or training, and a kayak or canoe.

Nowadays it is a problem that more and more people have sedentary occupations. We sit in comfortable chairs which are basically supposed to support the body, but which more often than not help to cause back problems. A contributory factor is also often the result of little physical activity, which means that the supporting muscles are not maintained, but are debilitated. Similarly, many fitness machines are of such a nature that they provide static and/or very repetitive exercises which contribute to an unbalanced training exercise that may result in wear injuries on long-term use.

PCT Publication WO02/05697 describes an exercise apparatus primarily intended to have an exercise effect on all surrounding muscles and tendons of the muscle groups that are the main focus of the exercise. The embodiments in this document are also related to the principle of controlled exercise by having to balance and control instability on physical exertion. The document describes, among other embodiments, an exercise bench primarily for strengthening a person's abdominal muscles, but where the embodiment can be set to be unstable so that the user experiences an effect on all surrounding muscles.

This known solution will, during a person's exercises and under controlled instability, have positive health effects on the person's muscles, tendons and balance. This positive effect will not only apply in the case of exercises for pure strength training, but also in the case of exercises during rehabilitation after injury.

Exercise apparatus which simulate the activity of rowing/paddling a boat, a kayak or other floating vessel have been on the market for many years. In a real rowing or paddling situation, a user will use oars or paddles to drive the vessel forwards in the water using resistance from the water. In addition, and in particular in the case of narrow rowing boats and kayaks, the user will also use the oars or paddles to keep his balance in the vessel. Thus, the user will distribute force among many muscles in order to maintain balance and propel the boat forwards.

Such simulation means for best possible duplication of real rowing or paddling will of course help to optimise physical exercise on such an apparatus. However, none of the known physical exercise apparatus related to rowing or paddling have such optimisation possibilities.

It is therefore an object of the invention to provide means which allow optimal simulation of real rowing or paddling conditions.

A particular object of the present invention is to simulate resistance in water, and to give the user an instability very similar to that experienced in a real rowing or paddling situation.

The apparatus according to the invention will also be equipped with means for adjusting instability. It is important that movement of the instability-generating devices in the apparatus can be easily adjusted, and that this adjustment is stepless from a lockable position. This will spare a first-time user from experiencing a movement of the fitness apparatus for which he was unprepared.

The invention will now be explained with reference to the attached drawings.

Figs. 1a-1c are respectively a rear view, a top view and a side view of an exercise apparatus in the form of a rowing machine, and with a function for "resistance in water" and instability.

Figs. 2a and 2b show the rowing machine from behind and in perspective, from above and from below respectively.

Fig. 3a is a schematic diagram for a hydraulic mechanism that is a component of the rowing machine.

Fig. 3b is a schematic diagram for a hydraulic mechanism that is a component of an exercise apparatus in the form of a paddling machine for optimal simulation of real conditions during paddling, including water resistance and instability.

Figs. 4a-4c are respectively a front view, a top view and a side view of a paddling machine which is related to the schematic diagram in Fig. 3b.

10

Fig. 5 shows the paddling machine in perspective from in front and from above, where the paddling machine comprises a function for resistance and instability.

15

Figs. 6a and 6b show, from behind, respectively a rowing machine and a paddling machine with tilting seat.

20

Fig. 7a shows in perspective a rotor part of a centrifugal fan; Fig. 7b shows in perspective the centrifugal fan; Fig. 7c shows the section VIIc-VIIc in Fig. 7d; and Fig. 7d shows the section VIId-VIId as indicated in Fig. 7c.

The following description will examine how the invention can be implemented for exercise apparatus that simulate rowing and paddling.

Figures 1a-1c are respectively a rear view, a top view and a side view of a rowing machine. Figures 2a and 2b show the same rowing machine in perspective. A seat 1 is slidably mounted on a track 2 in upper frame part 4 of the machine. The upper frame part 4 is fastened to a lower frame part 6 at shaft joint 7 and at suspension points 9 and 10. Fastened to the suspension points 9 and 10 are hydraulic piston cylinders, referred to herein as stabiliser cylinders 12 and 13, which movably support upper frame part 4, and at their other end the stabiliser cylinders 12 and 13 are secured to the lower frame 6 at points 14 and 15. Attached to the upper frame part 4 are two oars 16 and 17 which, through links 20 and 21, are fastened to arms 22 and 23 which in turn are fastened to beam member 25 via links 20', 21', the beam member 25 being a part of the upper frame part 4. Mounted between end points 26 and 27 on the oars and said arms 22, 23 and said beam member 25 at respective points 28 and 29 are hydraulic piston cylinders, called oar cylinders 31 and 32. All the cylinders of the rowing machine are hydraulic and are connected in a system which will be described in connection with Fig. 3a. Figs.

1c, 2a and 2b show centrifugal fans 34 and 35 and hydraulic tank 38. As will be explained in connection with Fig. 3a, the centrifugal fan will, amongst other things, serve to simulate "resistance in water". Two footrests 41 and 42 are also secured to the movable frame part.

5

A panel 50 is also shown, which, e.g., is affixed to the lower frame part. The panel will contain an operating panel and a display screen, or a touch screen.

The movable upper frame part 4, including seat 1, tracks 2 and oars 16, 17, has a function for sideways tilting movement transverse to the seat's 1 direction of travel along the track 2, and a certain upward movement created by there being different pressure in each of the stabiliser cylinders 12 and 13. The movements are indicated by arrows 52 and 53 in Figures 1a and 1c respectively.

15 A "standard" known rowing machine is used in that a person sits on the seat 1 with his feet placed on footrests 41, 42 and pulls on the oars 16, 17 towards the upper part of his body whilst he pushes himself backwards using his feet. The oars 16, 17 will normally be connected to air/gas cylinders that either can be moved or have means for adjusting the pressure/air through-flow in order to set the movement resistance the user requires for performance of the rowing exercise.

Unlike this prior art, the present invention gives the user the challenge of maintaining balance during the exercise. As is well known, an uneven pull on the oars in a real rowing boat will typically result in tilting motions, i.e., the rowing boat heels. If the user does not pull with the same force on both oars 16, 17 simultaneously, the upper frame part 4 will tilt to the side on which least force is exerted.

As shown in Fig. 7, it is possible to set the resistance of the oars by turning a central part or valve 130 of the centrifugal fans 34, 35; 108, 109, wherein the central part or the valve 130 has adjustable openings 134 for through-flow of air. The use of centrifugal fans provides a resistance that is progressive and will resemble the resistance that would be encountered on the displacement of water during the movement of the rowing boat or kayak/canoe in water.

35 The following will describe a hydraulic system which is shown in connection with the schematic diagram in Figs. 3a and 3b. The schematic diagrams 3a and 3b show just one side of the system, but it will be understood that the rowing machine (related to Fig. 3a)

has such a system for each oar, and that the paddling machine (related to Fig. 3b) has such a system related to each blade on the paddle.

As shown in Fig. 3a, an oar cylinder 60 is connected to a rowing boat oar 61, and there is also a stabiliser cylinder 62 and a drive unit 63 for the centrifugal fan of the rowing machine. The stabiliser cylinder 62 is via a throttle valve 65 connected to a hydraulic fluid tank 64. The tank 64 is, as shown, directly connected to the oar cylinder 60. On movement of the oar, as indicated by the arrow 66, a piston 67 in the cylinder 60 will displace hydraulic fluid on the piston rod side of the piston 67 into a drive unit 63 which is designed mechanically to operate the centrifugal fan 34, 35, thereby bringing the centrifugal fan into rotation. Hydraulic fluid will thus enter into the stabiliser cylinder 62 (corresponding to the cylinders 12, 13 in the rowing machine) at the same time. If even force is not exerted on both oars 16, 17 simultaneously there will be uneven pressure in the respective stabiliser cylinders, and thus the upper part of the bench will tilt towards the stabiliser bar or stabiliser cylinder 12 or 13 which was given least pressure. The exertion of force on the oars 16, 17 will also produce pressure in the stabilisers 12, 13 which results in a lifting of the forward part of the machine and which thus simulates a natural lift, a pitching or a rocking motion of a rowing boat in water. The more force exerted on the oars 16, 17 and respective oar cylinders 60, the more pressure will drive the centrifugal fan 34, 35 on the rowing machine. When the speed of the rotor part 133 of the fan 34, 35; 108, 109 increases, the air resistance therein will increase progressively and even more force must be applied in an attempt to maintain rotational speed. This property seeks to simulate the resistance an oar or optionally a paddle will meet on a pushing movement in water. The air resistance in the centrifugal fans can be adjusted by opening or closing a valve for the air supply to the fan. A closing of the air intake will result in the fan giving minimal resistance and a large intake will result in an increase of the resistance in the fan. This is prior art. Figs. 7a-7c show a centrifugal fan 131 which has a valve 130 that can be rotated as indicated by arrow 132, and which gives the blades 133' of the rotor part 133 of the fan a supply of air. The rotor part of the fan is connected via a shaft 136 to a drive unit 135 which is connected to the hydraulic system. The drive unit 135 is merely indicated by a block in the figures, but is known art for the person of ordinary skill in the field. This drive unit is also indicated by the reference numeral 63 in Fig. 3a for the rowing machine. The reference numeral 68 in Fig. 3a points to a one-way valve which lets air past the drive unit 63 for the rowing machine's centrifugal fan on return of the oars 16, 17 and associated cylinders 60.

The schematic diagram in Figs. 3a and 3b also shows a hydraulic pump 70 driven by an electric-powered motor which imparts pulsation pressure to the hydraulic fluid for simulating waves. The pump thus affects the pressure in the stabiliser bars, i.e., the cylinders 12, 13, and the user will experience this as waves when using the apparatus.

- 5 The reference numeral 72 indicates a pressure gauge and adjusting mechanism for the wave simulation.

Fig. 3b is a schematic diagram for a paddling machine as shown in Figs. 4 and 5. The only difference from the embodiment in the diagram relating to the rowing machine will be the operation of the centrifugal fan 108, 109. This means that the drive unit 63 and the check valve 68 in Fig. 3a are not found in Fig. 3b in connection with the paddling machine. The fan 108, 109 in this case is not moved by pressure of fluid, but directly via wire drive 97, 98 which runs, as shown in Figs. 4 and 5, via pulleys 104, 105 and which via an idler pulley 104', 105' and associated belt drive 104'', 105'' drives  
 15 respective drive pulley 108', 109' associated with the fan 108, 109. On movement of the oar 61', which corresponds to the oar 106 in Figs. 4a-4c, 5 and 6b, the piston 67' in the cylinder 60' will be moved as indicated by arrow 66', and fluid will then enter into the stabiliser cylinder 62', which will lift the beam 81 at the front edge. This will be understood by looking at Fig. 4c where stabiliser cylinder 87, which corresponds to the cylinder 62' in Fig. 3b, will be given increased pressure on the piston side on movement  
 20 of the oar 106. In contrast to the rowing machine described in connection with Figs. 1 and 2, only one oar 106 is used, but such an oar will of course in reality have a blade at each end. For propulsion of a real kayak through water, a person will alternate between a stroke of the paddle or oar on either side of the kayak hull. The system is connected  
 25 so that the stabiliser cylinders 85 and 86 (cf. the reference numeral 62' in Fig. 3b) as shown in Fig. 4a will be supplied with different pressure on movement of the oar for simulating paddling motion and tilting of a kayak. If the "right" force is not exerted on the oar, the stabiliser cylinders will be given such pressure that the upper part of the beam 81 is made to tilt sideways to simulate the imbalance of a kayak. The reference  
 30 numeral 70' indicates a hydraulic pump that is driven by a non-illustrated electrically controlled motor, the pump 70' being designed to provide pulsating pressure stress in order to simulate waves. The reference numeral 72' indicates a pressure gauge and adjusting mechanism for controlling the wave simulation via the motor which drives the pump 70'. The reference numeral 64' indicates a tank for hydraulic fluid.

35

For the training of sportsmen who are active kayak paddlers, there are various exercise apparatus for "dry training" of paddling motion. As in connection with the rowing



machine, the invention comprises a solution for "resistance in water" and instability (heeling of the kayak) adapted to a paddling simulator. Figs. 4a-4c are respectively a front view, a top view and a side view of the paddling machine. Fig. 5 shows the paddling machine in perspective. A seat 80 is secured to a beam 81, and on the beam 5 81 there are also mounted footrests 82 and 83. Fastened to the beam 81, via an articulation, are three stabiliser cylinders 85, 86 and 87, which at their other end via an articulation are fastened to a base frame 90. Hydraulic cylinders 93 and 94 are fastened to the base frame 90 at points of attachment 91 and 92 at the rear end thereof. The function of these cylinders 93, 94 is the same as that shown and explained for cylinder 10 60' in connection with Fig. 3b. A wire 97, 98 is fastened to respective ends 106', 106" of the oar 106. These wires 97, 98 run via a respective pulley 104, 105 at the forward end of the paddling machine and then to each of the cylinders 93, 94, preferably to the piston rod thereof, via respective pulleys 99 and 100 which are fastened to the piston rod belonging to respective cylinder 93, 94 and thence to a forward point of attachment 15 101 and 102. Rotationally connected to the pulleys 104, 105 is an underlying pulley 104', 105' which via a belt drive or the like 104", 105" causes rotation of a respective drive pulley 108', 109' which directly drives the rotational part of respective centrifugal fan 108, 109. In Figs. 4a, 4b and 5, the oar is shown "hanging in the air", but in use it will be in the hands of the person carrying out the paddling-like movement of the oar 20 106. The reference numeral 110 indicates a tank for hydraulic fluid, i.e., corresponding to the tank 64' in Fig. 3b.

The paddling machine is used in that a person sits on the seat 80 with his feet on the footrests 82, 83 and holds the paddle 106 with both hands, one towards each end of the 25 paddle. The user then pulls alternately on each end of the paddle to imitate a paddling motion. The hydraulic piston cylinders, here called oar cylinders 93, 94, and which correspond to the cylinder 62' will, together with the centrifugal fans 108 and 109, provide counterforce for the paddling exercise.

30 The paddling machine as constructed according to the present invention is connected to a hydraulic system as in Fig. 3b and has certain similarities with what has been shown and described in connection with the rowing machine illustrated in Figs. 1, 2 and 3a. The upper part 81 of the machine with seat 80 and footrests 82, 83 will be tiltable and thus unstable in the lateral direction like a kayak floating on the water and which as 35 known can easily heel or tilt. To maintain balance, the user must move his hips and the upper part of his body to counter the tilting movement. Thus, when the user carries out paddling exercises, the force exerted on the oar cylinders 93, 94 (cf. 60' in Fig. 3b) will

actuate the stabiliser cylinders 85, 86 (cf. 62' in Fig. 3b) to give a tilting movement of the seat 80 to the opposite side of the paddling side, i.e., on the side where the blade of the paddle is not in the water.

- 5 The instability function which is a part of the present invention and especially related to rowing and paddling machines, can through the use of hydraulics be made having variants of what has been shown here. For example, there could be linked together several stabiliser cylinders which give a more finely adjustable movement of the apparatus parts, so that the user is provided with motions for an optimal true-to-life, simulated experience of the motions of a kayak, i.e., how water and in particular waves can affect a rowing or paddling trip.

In connection with different exercise apparatus, and in particular rather advanced exercise apparatus intended for indoor use, for example, in health studios and fitness institutions, it has become common to have electronics that control the functions of the apparatus. In addition, there are systems which measure the performance of the person using the apparatus. In connection with the rowing machine and paddling machine described herein there is shown, for example, in Figures 1 and 4, panel 50 and 84 which contains switches and display screen with or without touch function. The panel may be part of a system that will have PC-like functions. Such equipment makes it possible for the user to link up to a network for downloading programs containing exercises and different scenarios related to the individual fitness apparatus. In a network of several fitness apparatus, competition between a number of apparatus users is made possible, e.g., in a fitness studio.

25

It will be understood that the rowing and paddling machines that are described here with a system consisting of electronics and associated software can advantageously be connected to a control system for the hydraulic system for simulating different scenarios through the software. The control system is not shown in the form of a figure, but a system of servos for controlling the hydraulics will, together with associated electronics, be known or obvious art for a person of ordinary skill in the art. According to the invention, software may conceivably be provided that causes the control system to give the user experiences or scenarios such as: a heavy sea, waves, different currents in the water (co-current, counter-current, side current) and the like. It will also be possible to simulate, e.g., rowing or paddling with drift or abnormal propulsion because of side wind or a headwind or following wind.

35

A simple instability of rowing and paddling machines can be provided by making the seat unstable as taught in PCT Publication WO02/05697. Figures 6a and 6b show how this can be implemented in a rowing or paddling machine. Figs. 6a, 6b are an end view of a rowing machine and a paddling machine respectively. The whole machine in these  
5 figures is stable apart from the actual seat 120. The seat is secured to a frame 121 via a shaft 122 and is supported by, e.g., annular or elongated air chamber bodies 123 that are filled with air under pressure. The seat 120 will move tiltably about the shaft as indicated by arrow 124. The degree of tilting movement of the seat can be adjusted by varying the air pressure in the bodies 123. The bodies 123 can be connected to a pump  
10 (not shown) which may be of the hand pump or foot pump type, or a pump that is controllably operated by an electromotor.

P a t e n t   c l a i m s

1.

A physical exercise apparatus intended for stationary placement during use,  
5 characterised in

- that the apparatus includes a hydraulic system for providing sitting instability and/or generating exercise resistance; and
- that the hydraulic system consists of at least two hydraulic cylinders and at least two stabiliser cylinders, the hydraulic cylinders during use of the apparatus  
10 being designed to deliver a pressure which actuates the function of said stabiliser cylinders for generating said instability of the exercise apparatus.

2.

An apparatus as disclosed in claim 1, characterised in

- 15 - that said hydraulic cylinders are designed to deliver hydraulic pressure to a drive unit that operates an adjustable centrifugal fan so as to generate a progressive exercise counterforce

3.

20 An apparatus as disclosed in claim 1, characterised in

- that the generation of progressive exercise counterforce is designed to take place in that an apparatus user's physical movements cause direct mechanical actuation of an adjustable centrifugal fan.

25 4.

An apparatus as disclosed in claim 1 or 2, characterised in

- that the exercise apparatus is in the form of a rowing machine equipped with two oars, a back-and-forth sliding seat and footrests;
- that the oars are functionally connected to said hydraulic cylinders; and
- 30 - that the seat, oars and footrests of the rowing machine are unstably supported on a frame for controlled tilting movement thereof transverse to the direction of movement of the seat.

5.

35 An apparatus as disclosed in claim 1 or 3, characterised in

- that the exercise apparatus is in the form of a paddling machine equipped with a paddle, and fixable seat and footrests;

- that the end portions of the paddle are functionally connected to said hydraulic cylinders; and
- that the seat, paddle and footrests of the paddling machine are unstably supported on a frame for controlled tilting movement thereof transverse to the direction of movement of the paddling machine.

6.

An apparatus as disclosed in claim 5, when subordinate to claim 3, characterised in

- that said physical movements are related to movement of the paddle.

7.

An apparatus as disclosed in claim 4 or 5, characterised in

- that the seat, oars/paddle and footrests are unstably supported on the frame for movement upwards and downwards relative to the longitudinal direction of the apparatus in order, together with the tilting movement, to create an imbalance which simulates waves.

8.

An apparatus as disclosed in one or more of claims 4-7, characterised in

- that different pulling force on the rowing oars or on one or other side of the paddle is designed to produce pressure in the stabiliser cylinders for tilting movement of the upper part of the apparatus, including seat, footrests and oars or paddle, to the opposite side from where the greatest oar force was exerted.

9.

An apparatus as disclosed in one or more of claims 1-8, characterised in

- that said hydraulic system is connected to a pump for generation of pressure for movements of the upper part of the apparatus, e.g., for simulating wave motions.

10.

An apparatus as disclosed in one or more of the preceding claims, characterised in

- that during use the hydraulic system of the apparatus is controllable to simulate operating conditions for a vessel, e.g., a rowing boat or kayak, such as a heavy sea, waves, different currents in the water (co-current, counter-current or side current), following wind, headwind or side wind.

11.

An apparatus as disclosed in one or more of claims 1-10, characterised in

- that the apparatus can be connected to a control system designed to be included in a network for downloading management and coordination software; and
- 5 - that the apparatus control system via the network can be connected to control systems of other exercise apparatus for real time competition between several apparatus users.

12.

10 An apparatus in the form of a rowing machine with two oars, a sliding seat and footrests, wherein the oars are subjected to movement resistance during the performance of an exercise, characterised in

- that the rowing machine seat is unstably supported on a frame for tilting
- 15 movement transverse to the longitudinal direction of the rowing machine.

13.

An apparatus in the form of a paddling machine with a seat, paddle and footrests, wherein the paddle is subjected to movement resistance during the performance of an

20 exercise, characterised in

- that the paddling machine seat is unstably supported on a frame for tilting movement transverse to the longitudinal direction of the paddling machine.

25 14.

An exercise apparatus as disclosed in claim 12 or 13, characterised in

- that the seat is supported by at least one air-filled body; and
- that the pressure of said body's air chamber is adjustable for determining the degree of tiltability of the seat.

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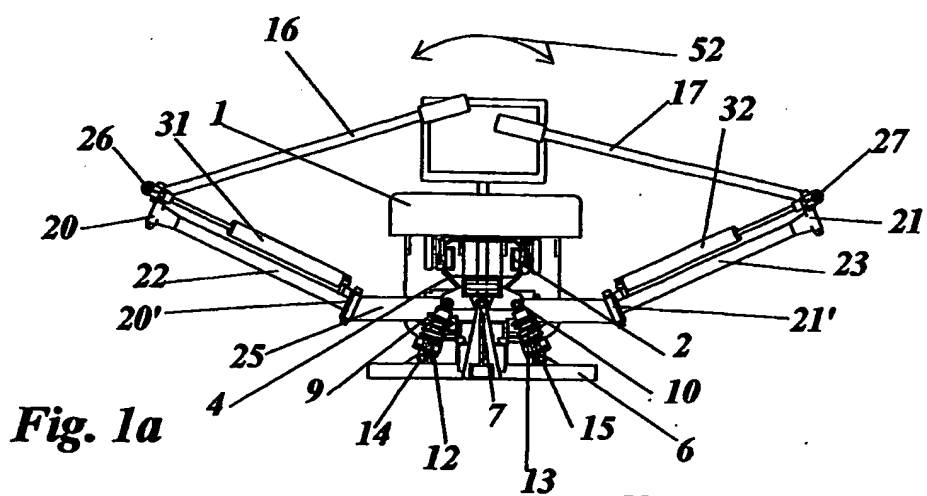


Fig. 1a

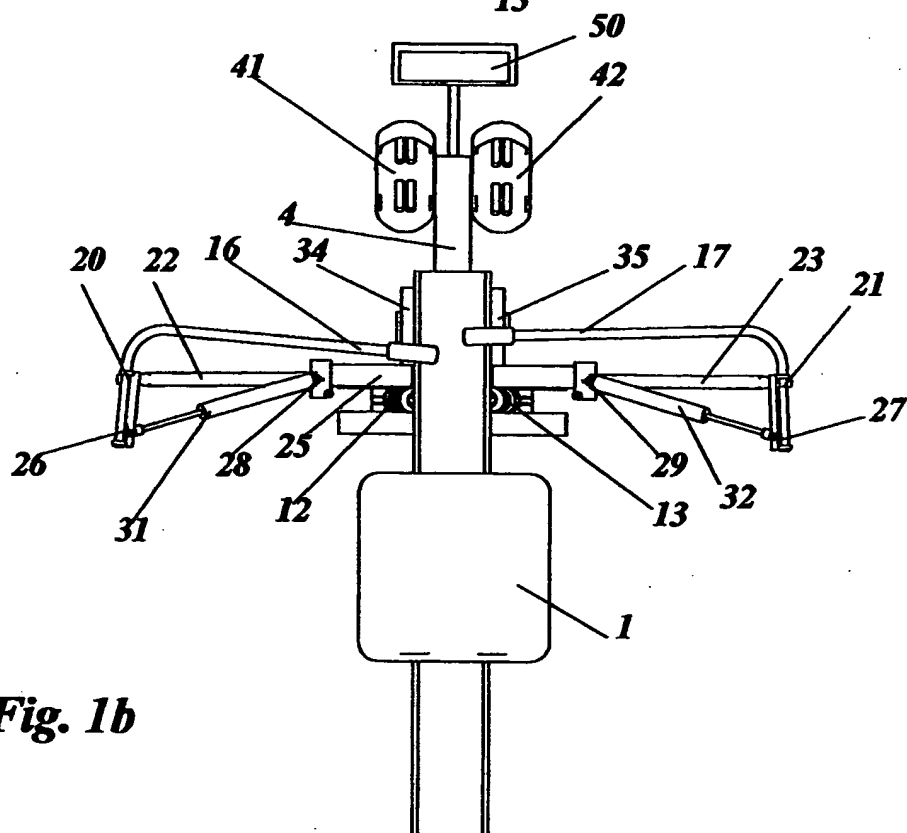


Fig. 1b

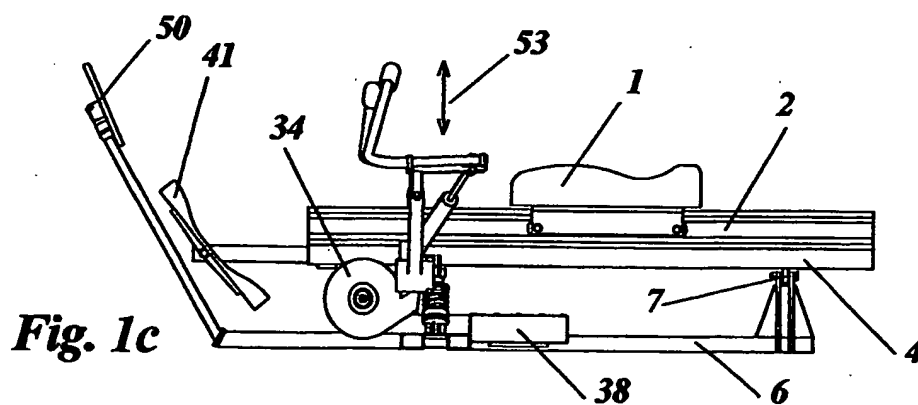
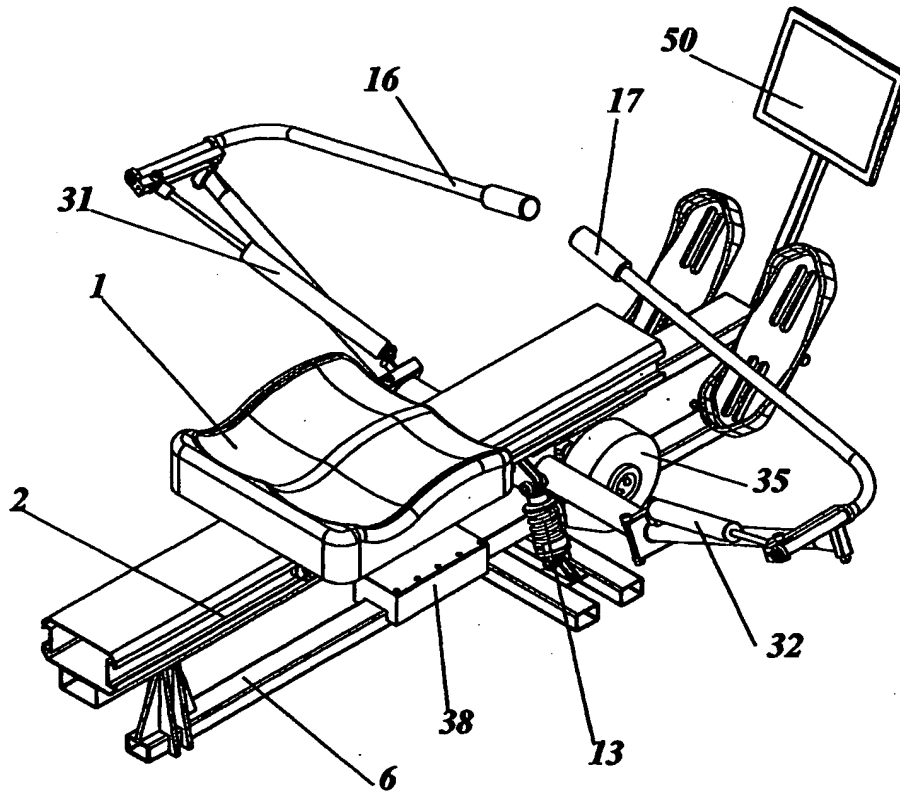
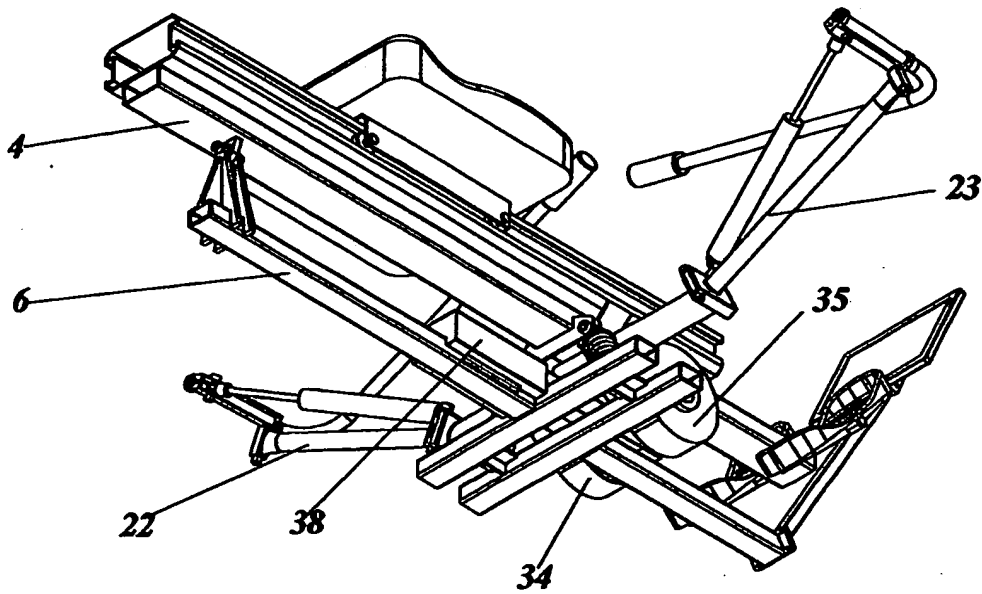


Fig. 1c

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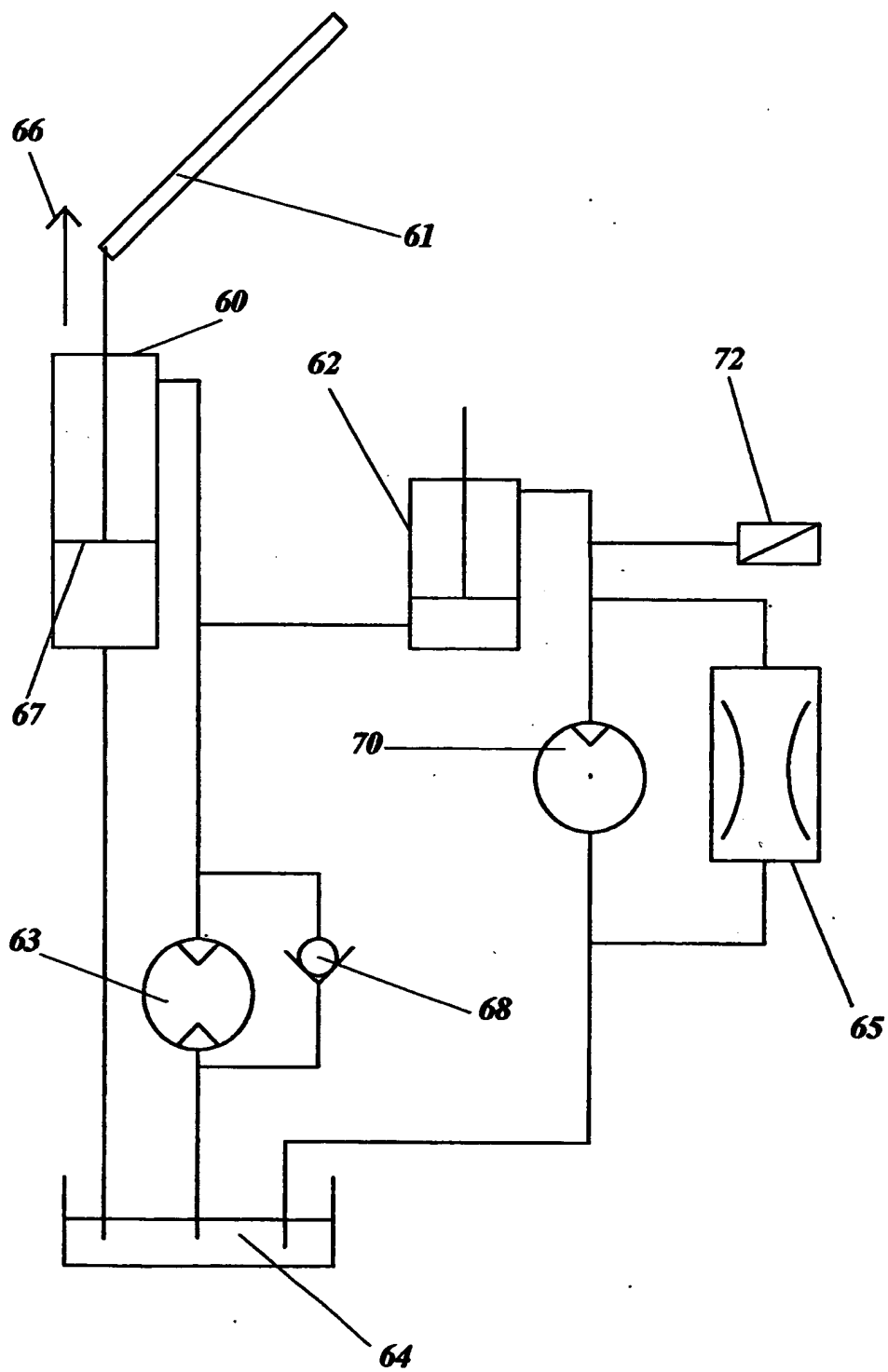
**Fig. 2a**



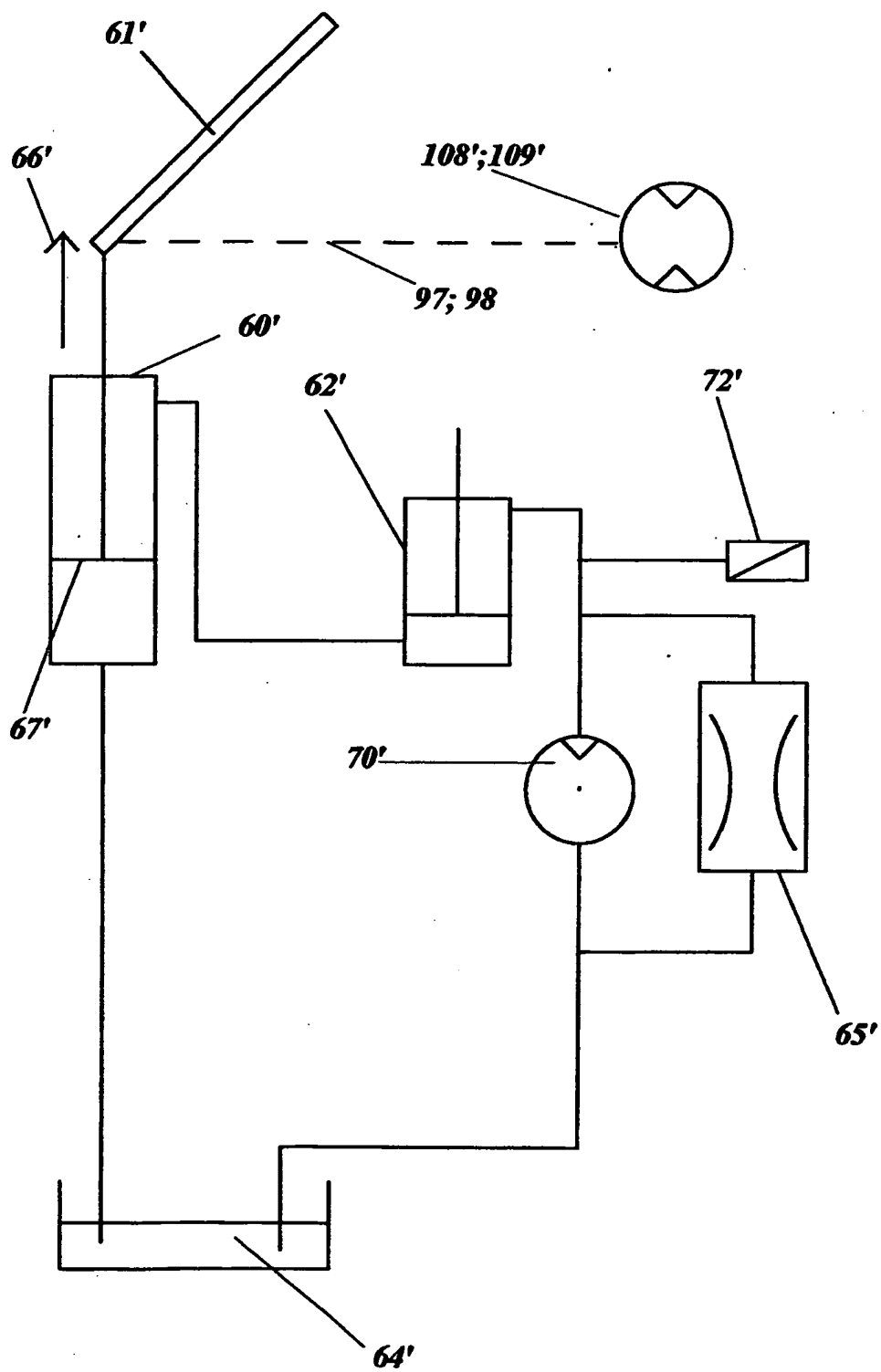
**Fig. 2b**



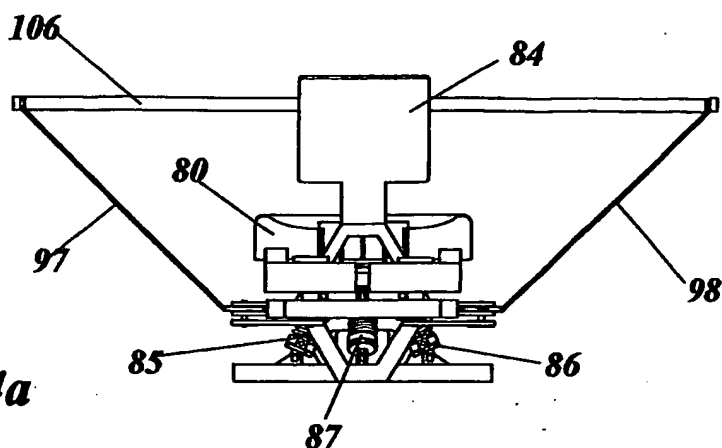
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**Fig. 3a**

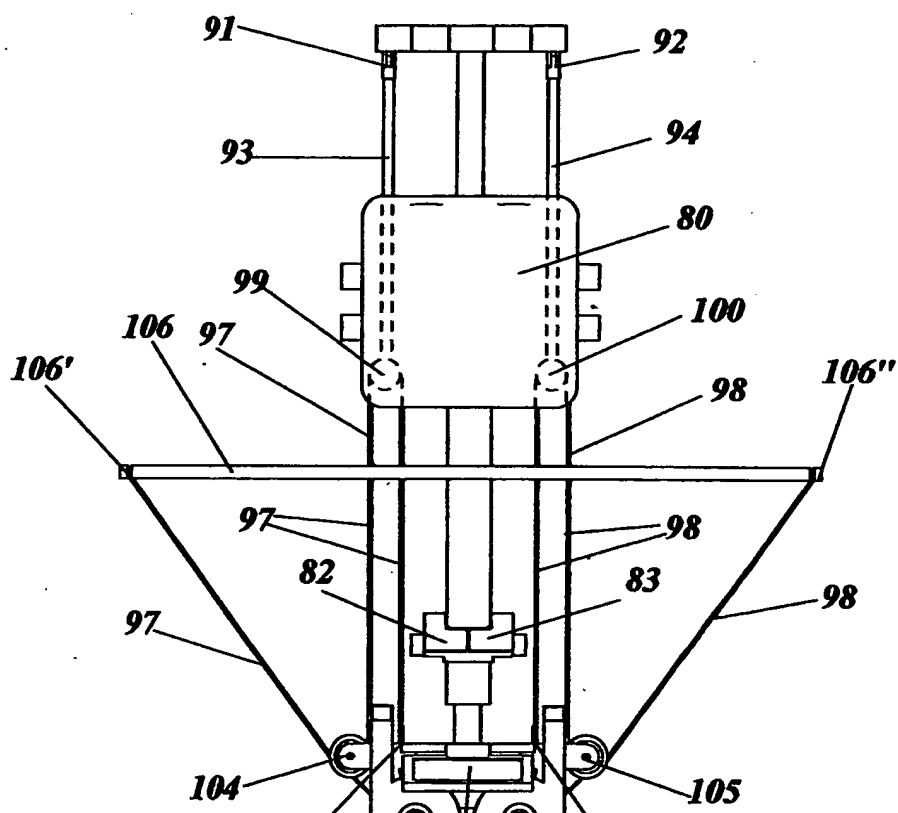
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**Fig. 3b**

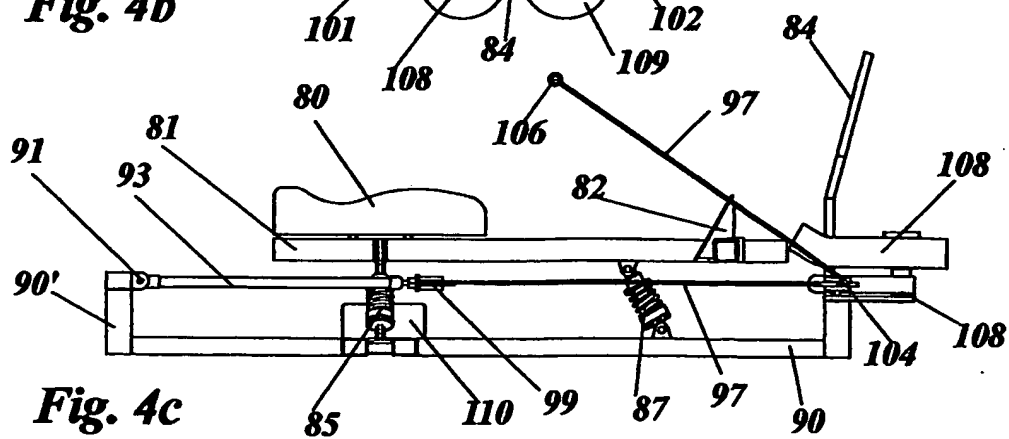
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**Fig. 4a**

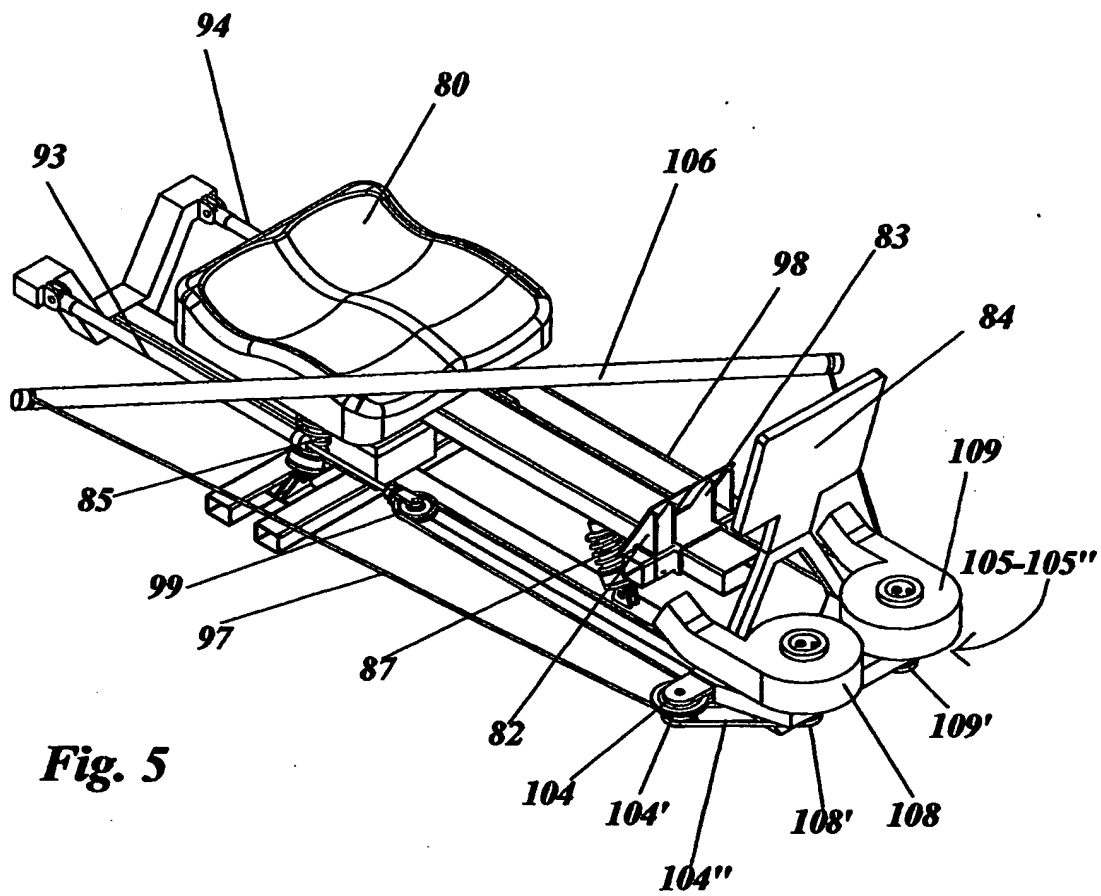


**Fig. 4b**

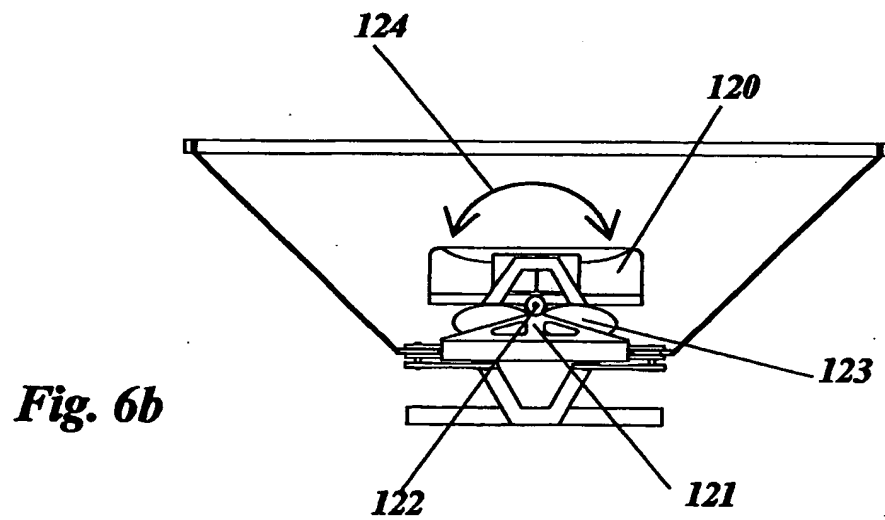
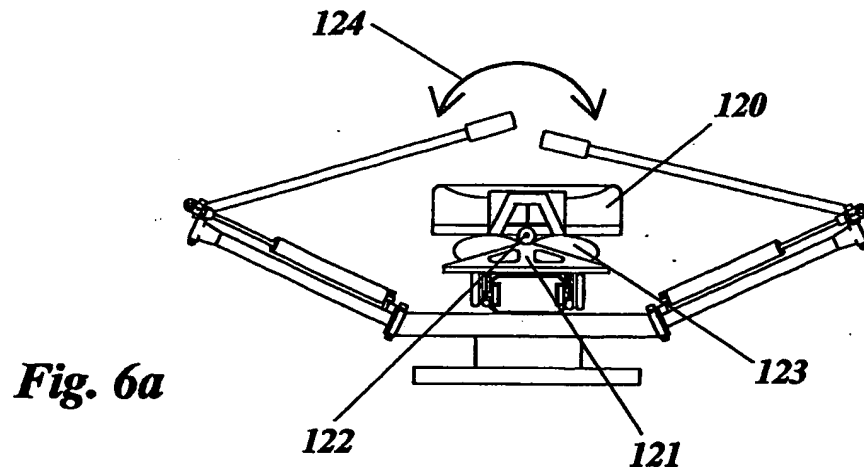


**Fig. 4c**

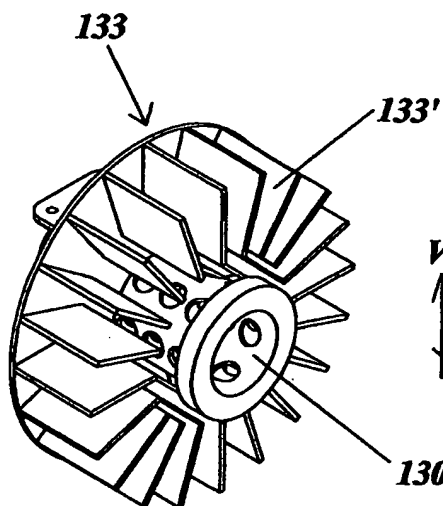
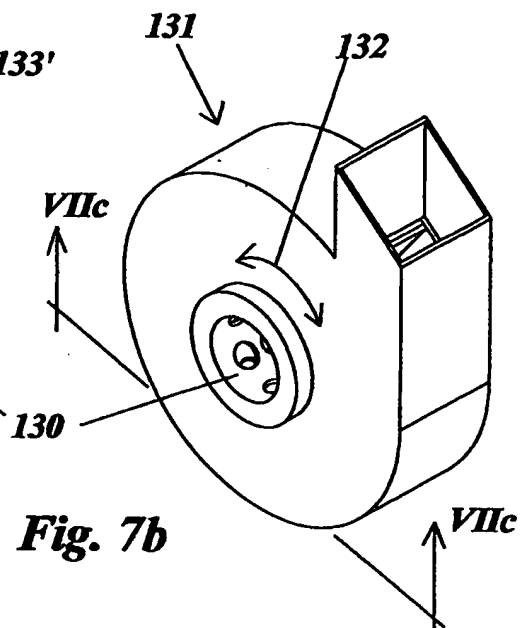
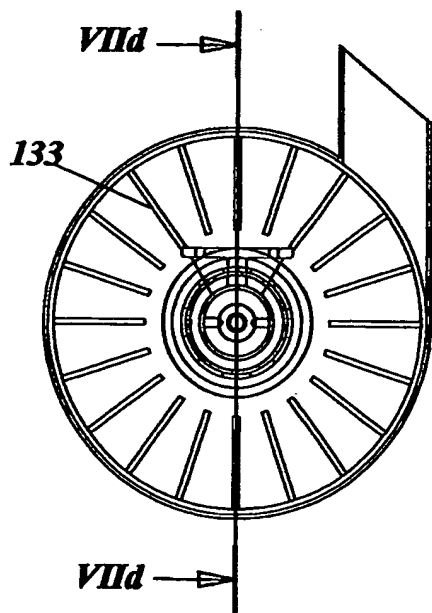
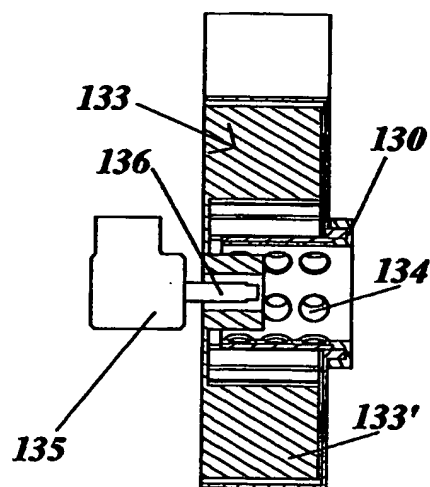
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**Fig. 7a****Fig. 7b****Fig. 7c****Fig. 7d**

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/NO 2004/000183

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
IPC7: A63B 69/06, A63B 22/16 According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols)		
IPC7: A63B		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
SE,DK,FI,NO classes as above		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
EPO-INTERNAL, PAJ		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5441469 A (M. CHERN), 15 August 1995 (15.08.1995), whole document	12-14
A	—	1-11
X	SE 460176 B (JOHANSSON, B.), 18 Sept 1989 (18.09.1989), whole document	12-14
A	—	1-11
A	US 4650181 A (T.T. YANG), 17 March 1987 (17.03.1987)	1-14
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "B" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search		Date of mailing of the international search report
4 October 2004		05-10-2004
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86		Authorized officer  Christer Bäcknert / MRo Telephone No. +46 8 782 25 00

# INTERNATIONAL SEARCH REPORT

Information on patent family members

03/09/2004

International application No.

PCT/NO 2004/000183

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				CA	2140676 A	14/07/1996
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